

CLAIMS

1. An electron beam exposure method in which an article subjected to exposure and an electron beam irradiation spot are moved relative to each other at a continuous speed;

wherein the article is exposed at a plurality of irradiation intensities of an electron beam by changing a transmittance of an electron optical system for forming the electron beam irradiation spot on the article.

2. The electron beam exposure method as claimed in Claim 1, wherein the transmittance of the electron optical system is changed by changing a state of hitting of a blanking mask by the electron beam.

3. The electron beam exposure method as claimed in Claim 2, wherein the state of hitting of the blanking mask by the electron beam is changed by controlling a state of deflection of the electron beam by a blanking deflector.

4. The electron beam exposure method as claimed in Claim 3, wherein the state of deflection of the electron beam by the blanking deflector includes a first deflection state in which the electron beam is deflected in a first direction by the blanking deflector such that a whole of the electron beam hits the blanking mask, a second deflection state in which the electron beam is deflected in a second direction by the blanking deflector such that the electron

beam does not hit the blanking mask at all and a third deflection state in which the electron beam is not deflected by the blanking deflector such that a portion of the electron beam hits the blanking mask.

5 5. The electron beam exposure method as claimed in Claim 2, wherein the irradiation intensity obtained at the time a portion of the electron beam hits the blanking mask is not more than 97 % of that obtained at the time a whole of the electron beam hits the blanking mask.

10 6. The electron beam exposure method as claimed in Claim 2, wherein a plurality of transmission shapes of the electron beam are formed on the blanking mask such that the exposure is performed at a plurality of the irradiation intensities of the electron beam.

15 7. The electron beam exposure method as claimed in Claim 6, wherein when a direction of deflection of the electron beam is changed continuously by a blanking deflector, the irradiation intensity of the electron beam changes discontinuously.

20 8. The electron beam exposure method as claimed in Claim 6, wherein when a direction of deflection of the electron beam is changed continuously by a blanking deflector, the irradiation intensity of the electron beam changes continuously.

25 9. The electron beam exposure method as claimed

in Claim 6, wherein when the blanking mask is moved continuously, the irradiation intensity of the electron beam changes continuously.

10. The electron beam exposure method as claimed
5 in Claim 1, wherein a transmission shape of an aperture is changed continuously such that the irradiation intensity of the electron beam changes continuously.

11. The electron beam exposure method as claimed
10 in Claim 1, wherein after the exposure of the article, a pattern is formed on the article by one of wet etching and dry etching.

12. The electron beam exposure method as claimed
in Claim 1, wherein a chemically amplified resist layer is formed on the article.

15 13. The electron beam exposure method as claimed
in Claim 1, wherein one of a pit and a line or both of the pit and the line are formed spirally on the article by the exposure.

20 14. The electron beam exposure method as claimed
in Claim 1, wherein the article is used for manufacturing a master of an optical information recording medium.

25 15. An electron beam exposure apparatus in which an article subjected to exposure and an electron beam irradiation spot are moved relative to each other at a continuous speed, comprising:

an electron optical system for forming the electron beam irradiation spot on the article; and

5 a blanking means for changing a transmittance of the electron optical system such that the article is exposed at a plurality of irradiation intensities of the electron beam by the electron optical system.

16. The electron beam exposure apparatus as claimed in Claim 15, wherein the blanking means includes a blanking deflector and a blanking mask.